



Amoco Oil Company

200 East Randolph Drive
Post Office Box 6110-A
Chicago, Illinois 60680

February 25, 1985

Certified Mail P26 2048521
Return Receipt Requested

Mr. Kenneth G. Mensing
Southern Region Manager
Land Field Operations Section
Division of Land Pollution Control
Environmental Protection Agency
117 West Main Street
Collinsville, Illinois 62234

Dear Mr. Mensing:

Information on Closed Disposal Site; Amoco Riverfront, Wood River

As agreed in our November 27, 1984, meeting, we are enclosing the data and information on the closed disposal site on Amoco's riverfront property in Wood River.

The enclosure consists of the following:

1. Past monitoring data from wells around the site.
2. Design and construction details comprising:
 - a. a "Technical and Cost Proposal";
 - b. a "Data and Design Report";
 - c. "Test Results"; and
 - d. as-built drawings.
3. A groundwater monitoring program satisfying the requirements of Subpart F.

As was discussed with you by phone January 28, the priority pollutant analysis of the January, 1984 samples (Table IV) indicated possible laboratory contamination. Therefore, we delayed sending you this package in order to enclose analytical results from the December, 1984 samples (Table VI) for comparison.

EPA Region 5 Records Ctr.



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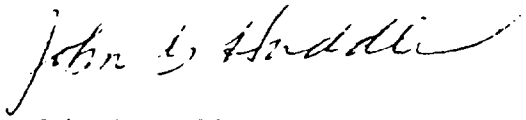
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Mr. Kenneth G. Mensing
Page 2

If you have any questions on this submission, please call me at 312/856-7826 or
G. J. Wurtz at 312/856-5858.

Yours truly,

A handwritten signature in cursive script, appearing to read "John G. Huddle".

John G. Huddle
Director, Environmental
Control and Planning
Mail Code 1203

EJS/dmk

Enclosures

Groundwater Monitoring Plan for Closed Disposal
Area on Amoco's Riverfront Property, Wood River

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1. The following wells are to be included in this program:

In the upper groundwater table:

RL-1S
RL-2S
P-5S
RL-14S
P-6S
P-12S
P-9S

In the uppermost aquifer:

RL-1
RL-2
P-5
P-12

Locations of these wells are shown on the attached map.

After the direction of flow in the upper groundwater table is determined under a program previously approved by the Agency, it is proposed that representatives of the Agency and of Amoco meet to determine the locations of additional upgradient and/or downgradient wells that may be required in both the uppermost aquifer and the uppermost groundwater table.

2. Following is the schedule of testing:

First year, quarterly, all wells:

	Max. MG/L		Max. MG/L		Max.
Arsenic	0.05	Selenium	0.01	Radium	5 pCi/l
Barium	1.0	Silver	0.05	Gross Alpha	15 pCi/l
Cadmium	0.01	Endrin	0.002	Gross Beta	4 millirem/yr.(1)
Chromium	0.05	Lindane	0.004	Coliform	1/100 ml.
				Bacteria	
Fluoride	1.4-2.4	Methoxychlor	0.1		
Lead	0.05	Toxaphene	0.005		
Mercury	0.002	2, 4-D	0.1		
Nitrate (As N)	10	2, 4, 5-TP	0.001		
		Silvex			

(1) Maximum dosage per individual based on a consumption of two liters a day.

First year, quarterly, all wells; subsequent years, annually, all wells:

Chloride
Iron
Manganese
Phenols
Sodium
Sulfate

First year, quarterly, all wells; quadruplicate tests on upgradient wells. Subsequent years, semi-annually, all wells; quadruplicate tests on all wells:

pH
Specific Conductance
Total Organic Carbon
Total Organic Halogen

3. Prior to sampling, the groundwater elevation in each well will be determined and recorded.
4. Prior to sampling, each well will be bailed or pumped dry. Samples will be taken after the well has recharged. The bailer or pump will be thoroughly rinsed with distilled or deionized water between wells.
5. One pint will be collected from each well for metals testing and preserved by reducing pH to 2.0 or less by adding nitric acid. One pint will be collected from each well for phenol and total organic carbon and preserved by reducing pH to 2.0 or less by adding sulfuric acid. The preceding two samples will be stored in an ice bath until analyzed. The following samples are to be preserved by placing in an ice bath until analyzed; no preservatives are to be added: 1 quart for pesticides, 1 quart for radiation, and 1 pint for anions and total organic halogen.
6. A chain-of-custody record must be completed for each sample or group of samples having the same destination. These forms are to be returned from the final destination to the environmental engineer at Wood River. The following information must be recorded for each sample:

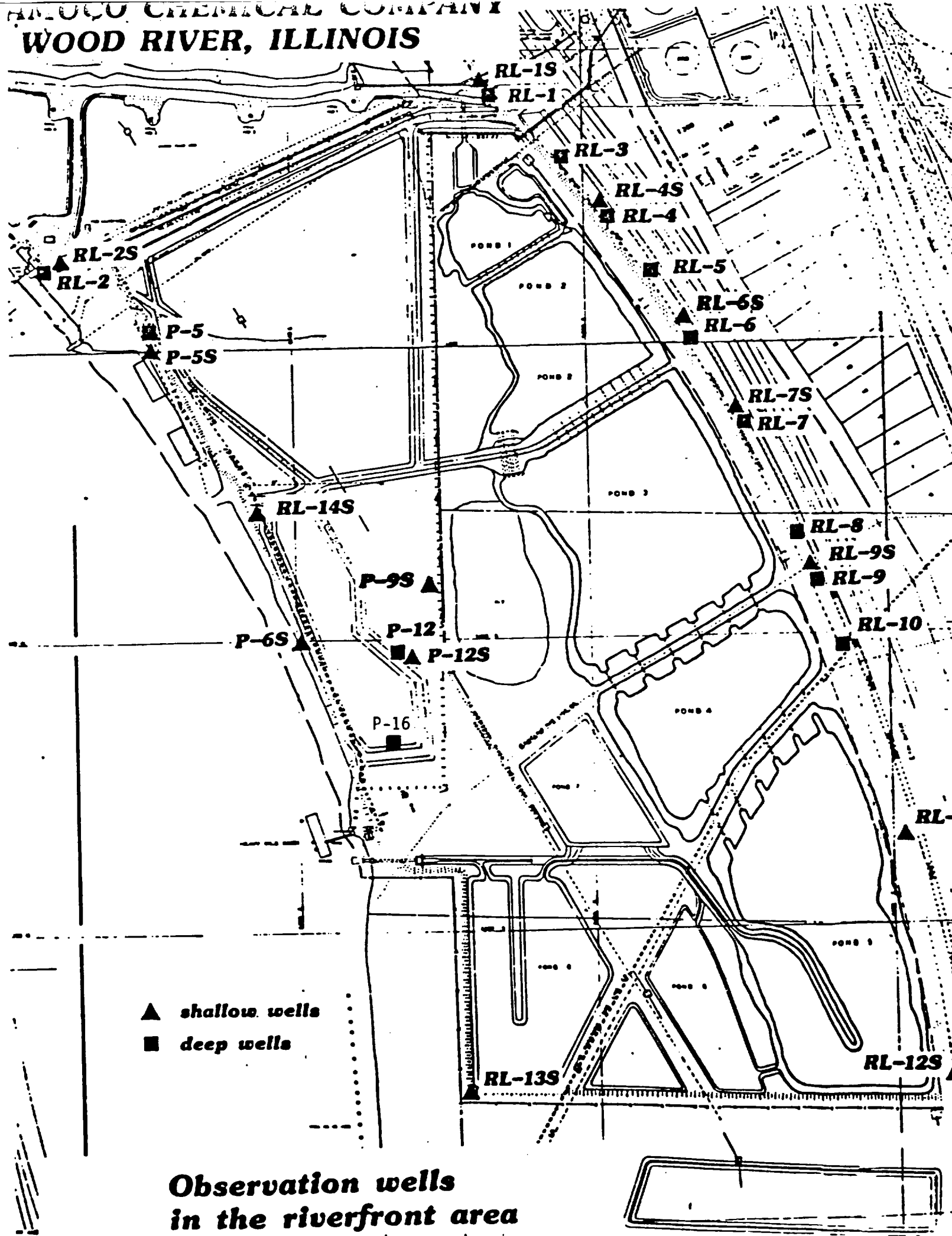
Date
Time
Well No.
Sampler's Name
Preservative
Test(s) Required
Special Instructions

7. pH and specific conductance will be determined in the field as samples are being collected.
8. The following test methods will be used:

Test	Method
Conductivity	Portable Conductivity Meter
pH	Portable pH Meter
Anions	Dionex Ion Chromatography
Arsenic and Selenium	Hydride Atomic Absorption
Lead	Furnace Atomic Absorption
Mercury	Cold Vapor Atomic Absorption
All Other Metals	Inductively Coupled Plasma Spectrometry
Total Organic Carbon	Technicon IV—Persulfate Oxidation
Phenol	4-Aminoantipyrine Method, Without Distillation
Pesticides	Gas Chromatography With Electron Capture

9. All replicate measurements for each indicator parameter (pH, specific conductance, total organic carbon, total organic halogen) from all upgradient wells obtained during the first year shall be combined to provide a background concentration for each of the indicators.
10. In the second and subsequent years, tests for the indicator parameters will be run in quadruplicate on samples from each well.
11. In the second and subsequent years, the arithmetic means of the indicator parameters, as determined semi-annually, will be statistically compared with the background means using Cochran's approximation to the Behrens-Fisher Student's T-Test at the 0.01 level of significance. A statistically significant increase (or pH decrease) in an upgradient well is to be reported in the annual submission of data. If a statistically significant increase (or pH decrease) is found in an indicator parameter in a downgradient well, the well will be resampled, the sample split, and the test(s) repeated on each half. If the repeat tests are confirmatory, the Agency will be notified within seven days.
12. In the first year, test results and groundwater elevations will be reported to the Agency within 15 days after completing the quarterly analyses. In subsequent years, this information, including statistical comparisons, will be reported annually, unless otherwise required by discovery of a statistically significant increase (or pH decrease) in indicator parameters in downgradient wells.
13. All records will be maintained 30 years unless the Agency approves termination of the program at an earlier date.

**ANALOCO CHEMICAL COMPANY
WOOD RIVER, ILLINOIS**



**Observation wells
in the riverfront area**

TABLE I

Analysis of Wood River Riverfront Groundwater
January 27, 1984

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<u>Well</u>	<u>Conductivity</u>				<u>pH</u>			
P-2	840	800	810	790	7.30	7.23	7.25	7.40
P-6	1210	1260	1250	1200	7.40	7.45	7.39	7.35
P-16	3600	3900	3900	3900	7.14	7.16	7.15	7.14
P-6S	4200	4000	3900	3800	9.74	9.80	9.79	9.49
P-9S	1500	1650	1600	1600	7.18	7.17	7.18	7.17
P-12S	11400	11400	11500	11500	10.46	10.83	10.75	10.85

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TABLE II

Analysis of Wood River Groundwater - "P" Wells - January, 1984

Sample	Anions, mg/l			Phenols mg/l	TOC, mg/l	TOX, mg/l	Alkalinity, mg/l as CaCO ₃
	Fluoride	Chloride	Sulfate				
P-2	0.3	41	ND	ND	11,10,11,10	ND, 0.03, 0.05, 0.09	280
P-6	0.2	71	ND	0.01	11,12,12,11	ND, 0.06, 0.08, ND	406
P-6S	0.9	103	ND	30	122,126,123,124	0.08, 0.06, 0.28, 0.04	725
P-9S	ND	189	ND	ND	67,66,67,67	0.14, 0.32, 0.43, 0.33	854
P-12S	9	3054	9	101	1610,1650,1600,1595	0.56, 0.78, 0.80, 0.98	2093
P-16	0.3	2257	ND	0.4	71,68,70,68	0.04, 0.03, 0.09, 0.09	992
Detection Limit	0.2	1.0	1.0	0.01	1.0	0.02	--

ND - Not Detected

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TABLE III

Metals in Wood River "P" Wells - January, 1984 - mg/l

<u>Sample</u>	<u>Pb</u>	<u>Hg</u>	<u>Zn</u>	<u>Mn</u>	<u>Cd</u>	<u>Cr</u>	<u>Fe</u>	<u>V</u>	<u>Cu</u>	<u>Ni</u>	<u>Na</u>	<u>Ba</u>	<u>Tl</u>	<u>Sb</u>	<u>Ag</u>	<u>As</u>	<u>Se</u>	<u>K</u>	<u>Ca</u>	<u>Mg</u>
P-2	0.005	0.0006	0.11	0.96	ND	ND	0.17	ND	ND	ND	32	ND	0.31	ND	ND	ND	ND	4.5	91	29
P-6	0.002	0.0007	0.04	3.0	ND	ND	0.44	ND	ND	ND	105	ND	0.52	ND	ND	ND	ND	6.2	118	39
P-6S	0.007	0.0007	0.34	0.26	ND	ND	1.4	0.31	ND	0.23	1340	ND	0.15	ND	ND	0.26	ND	4.3	97	8.9
P-9S	0.005	0.0005	0.08	11	ND	0.04	1.5	ND	ND	ND	158	ND	0.35	ND	ND	0.004	ND	4.8	229	87
P-12S	0.014	0.0005	0.52	0.42	ND	0.02	3.8	0.61	0.07	1.06	5500	ND	1.78	ND	ND	0.30	0.009	2.2	65	5.6
P-16	0.007	0.0002	0.41	13	ND	0.07	6.1	ND	ND	0.07	1070	ND	1.36	ND	ND	0.029	ND*	5.2	550	214
Detection Limit	0.002	0.0002	0.02	0.02	0.009	0.02	0.01	0.02	0.06	0.02	--	0.003	0.01	0.8	0.09	0.02	0.003	--	--	--
																	0.015*			

ND = Not Detected

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TABLE IV

Priority Pollutant Organics Detected Above 10 ug/l, January, 1984 Samples

<u>Sample</u>	<u>Compound</u>	<u>Concentration, ug/l</u>
P-2	None	
P-6	None	
P-6S	Methyl Ethyl Ketone	65
P-9S	None	
P-12S	Chloroform	27
	1,2-Dichloroethane	14
	Methylene Chloride	1394
	Methyl Ethyl Ketone	162
P-16	Benzene	15
	Ethylbenzene	25
	Toluene	21
	m-Xylene	29
	O+P xylene	22
	Methyl Ethyl Ketone	23
Field Blank	1,1,1-Trichloroethane	38

TABLE V
Analysis of Wood River Riverfront Groundwater
December 6, 1984

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<u>Well</u>	<u>Conductivity</u>				<u>pH</u>			
P-2	710	710	705	700	6.70	6.60	6.62	6.62
P-5	820	840	805	850	6.70	6.76	6.87	6.80
P-6	910	920	890	930	6.84	6.85	6.87	6.93
P-16	1610	1520	1460	1430	6.53	6.52	6.54	6.54
P-5S*	1400	1420			6.93	6.95		
P-6S	1450	1470	1460	1450	7.86	7.84	7.87	7.85
P-9S	1245	1250	1270	1250	6.79	6.68	6.71	6.64
P-12S	7800	8000	8000	8800	10.15	10.29	10.32	10.33

<u>Well</u>	<u>Depth to Water</u>	<u>Top of Pipe (MSL)</u>	<u>Water Elevation (MSL)</u>
P-2	38'-1"	441.00	402.92
P-5	28'-8"	436.30	407.63
P-6	22'-0½"	429.02	406.98
P-16	36'-5"	437.72	401.30
P-5S	22'-10"	437.31	414.48
P-6S	13'-0"	429.64	416.64
P-9S	2'-6"	420.33	417.83
P-12S	2'-3"	420.76	418.51

* Insufficient water quantity for analyses. Only sample sent was VOA.

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MAR 20 1985

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TABLE VI

Volatile Priority Pollutant Organics
Detected Above 10 ug/l,
December, 1984 Samples

Sample	Compound	Concentration, ug/l
P-2	Methylene Chloride	20
P-5	1,1-Dichloroethane	11
	1,1,1-Trichloroethane	31
P-6	None	
P-6S	None	
P-9S	None	
P-12S	Methylene Chloride	84
	Toluene	21
	Methyl Ethyl Ketone	433
	Chloroethane	62
P-16	None	

TABLE I

1984 SUMMARY OF INDICATOR PARAMETERS

Well No.		Specific Conductance Micromhos/cm				Total Organic Carbon mg/l				Total Organic Halogen mg/l				pH			
RL-1:	August	824,	825,	819,	801	16,	16,	16,	16	0.4,	0.3,	0.7,	0.9	7.1,	7.2,	7.2,	7.2
	December	612,	677,	678,	680	13,	14,	11,	12	ND,	ND,	ND,	ND	7.0,	6.9,	6.8,	6.8
RL-2:	August	1082,	1076,	1073,	1074	18,	19,	19,	19	1.7,	3.1,	1.6,	3.3	7.0,	6.9,	7.0,	7.1
	December	949,	957,	962,	964	9,	9,	10,	12	0.18,	0.15,	0.10,	0.12	6.9,	6.8,	6.9,	6.8
RL-3:	August	1455,	1476,	1473,	1490	34,	35,	35,	35	0.9,	0.9,	3.5,	3.2	6.4,	6.6,	6.6,	6.7
	December	1378,	1396,	1419,	1430	20,	22,	23,	22	0.09,	0.08,	0.04,	0.06	6.5,	6.7,	6.6,	6.6
RL-4:	August	**	**	**	**	24,	25,	23,	23	ND,	ND,	ND,	ND	**	**	**	**
	December	1475,	1500,	**	**	26,	27,	21,	22	0.15,	0.14,	0.14,	0.12	6.3,	6.4,	**	**
RL-5:	August	1371,	1398,	1410,	1420	21,	23,	19,	21	0.3,	0.2,	ND,	ND	6.5,	6.6,	6.6,	6.7
	December	1275,	1275,	**	**	25,	29,	29,	28	0.15,	0.14,	0.10,	0.12	6.5,	6.5,	**	**
RL-6:	August	905,	888,	862,	844	14,	13,	13,	13	1.2,	1.2,	0.9,	0.9	6.4,	6.6,	6.6,	6.6
	December	983,	974,	980,	1000	13,	12,	13,	13	0.17,	0.14,	0.13,	0.16	6.6,	6.7,	6.7,	6.8
RL-7:	August	868,	879,	892,	901	7,	7,	7,	7	2.8,	2.4,	0.7,	0.6	6.8,	6.9,	6.9,	7.0
	December	1017,	1028,	1021,	1012	7,	7,	7,	7	0.07,	0.06,	0.16,	0.15	7.3,	7.2,	7.2,	7.2
RL-8:	August	1390,	1394,	1373,	1390	7,	7,	7,	7	0.5,	0.4,	1.2,	1.2	6.7,	6.7,	6.8,	6.8
	December	1230,	1244,	1241,	1234	7,	7,	7,	7	0.03,	0.02,	0.04,	0.03	7.1,	7.0,	7.0,	7.0
RL-9:	August	945,	951,	981,	1000	8,	9,	8,	8	ND,	0.4,	ND,	0.4	6.8,	6.9,	6.9,	6.9
	December	1168,	1175,	1170,	1162	9,	11,	11,	12	0.22,	0.22,	0.28,	0.27	7.0,	7.0,	7.0,	7.0
RL-10:	August	781,	810,	765,	810	13,	13,	13,	13	0.6,	0.2,	0.5,	0.1	6.8,	6.9,	7.0,	6.9
	December	1002,	962,	950,	945	7,	8,	8,	8	0.20,	0.19,	0.22,	0.18	7.0,	7.2,	7.1,	7.2
Detection Limit		-				1.0				0.1 (August) 0.02 (December)				-			

ND = Not Detected

** Analysis not completed due to hydrocarbon interference

TABLE II

1984 PARAMETERS ESTABLISHING GROUNDWATER QUALITY
(mg/l)

<u>Well No.</u>		<u>Chloride</u>	<u>Iron</u>	<u>Manganese</u>	<u>Phenols</u>	<u>Sodium</u>	<u>Sulfate</u>
RL-1:	August	32	0.94	2.1	0.20	21	46
	December	20	1.6	2.2	ND	18	29
RL-2:	August	41	11	5.8	0.22	20	16
	December	15	8.7	4.0	ND	19	9
RL-3:	August	51	0.23	7.4	0.03	32	6
	December	69	16	4.0	ND	32	5
RL-4:	August	162	14	5.9	0.02	38	4
	December	247	21	5.3	ND	44	5
RL-5:	August	84	3.3	5.3	0.26	44	3
	December	77	0.39	4.1	ND	45	24
RL-6:	August	41	0.27	2.1	0.17	31	93
	December	47	1.4	3.9	ND	28	108
RL-7:	August	56	ND	0.15	0.10	57	125
	December	80	0.03	0.50	ND	64	159
RL-8:	August	47	0.67	1.3	0.35	41	296
	December	55	0.04	1.4	ND	48	275
RL-9:	August	62	ND	1.02	0.13	66	94
	December	62	0.05	1.5	ND	36	225
RL-10:	August	35	0.030	1.2	0.19	58	98
	December	33	0.07	0.98	ND	62	205
Detection Limit		1.0	0.01	0.02	0.01	-	1.0

ND = Not Detected

TABLE III

1984 PRIMARY DRINKING WATER STANDARDS

(mg/l)

<u>Well No.</u>		<u>Arsenic</u>	<u>Barium</u>	<u>Cadmium</u>	<u>Chromium</u>	<u>Fluoride</u>	<u>Lead</u>	<u>Mercury</u>	<u>Nitrate</u> <u>(as N)</u>	<u>Selenium</u>	<u>Silver</u>
RL-1:	August	0.006	0.43	0.012	0.04	4*	ND	0.0002	ND	ND	ND
	December	0.015	0.12	ND	0.06*	ND	ND	ND	ND	0.004	ND
RL-2:	August	0.020	0.54	ND	0.03*	5*	ND	ND	ND	0.004	ND
	December	0.026	0.22	ND	0.07*	ND	0.032	ND	ND	0.005	ND
RL-3:	August	0.008	0.49	ND	0.05	5*	ND	ND	6	ND	ND
	December	0.035	0.84	ND	0.09*	ND	ND	ND	ND	0.006	ND
RL-4:	August	ND	0.92	ND	0.06*	8*	ND	ND	1	0.011	ND
	December	0.026	1.0	ND	0.11*	ND	ND	ND	ND	ND	ND
RL-5:	August	0.012	0.66	ND	0.06*	2	0.011	ND	ND	ND	ND
	December	0.009	0.58	ND	0.09*	ND	ND	ND	1	ND	ND
RL-6:	August	0.003	0.14	ND	0.02	3*	0.010	ND	ND	ND	ND
	December	ND	0.16	ND	0.07*	ND	ND	ND	ND	ND	ND
RL-7:	August	ND	0.059	ND	0.02	5*	ND	ND	ND	ND	ND
	December	ND	0.14	ND	0.09*	ND	0.007	ND	ND	ND	ND
RL-8:	August	ND	0.13	ND	0.03	ND	ND	ND	ND	0.002	ND
	December	0.006	0.06	ND	0.09*	ND	ND	ND	ND	ND	ND
RL-9:	August	0.004	0.11	ND	0.02	ND	ND	ND	ND	0.002	ND
	December	ND	0.14	ND	0.09*	ND	ND	ND	ND	ND	ND
RL-10:	August	0.005	0.12	ND	0.02	ND	ND	ND	ND	ND	ND
	December	0.013	0.11	ND	0.09*	ND	ND	ND	ND	ND	ND
Drinking Water Standards		0.05	1.0	0.01	0.05	1.4-2.4	0.05	0.002	10	0.01	0.05
Detection Limit:		0.002	0.01	0.009	0.02	1.0	0.01	0.0002	1.0	0.002	0.02

* = Exceeds Primary Drinking Water Standard

ND = Not Detected

TABLE III (Continued)

1984 PRIMARY DRINKING WATER STANDARDS (Continued)

<u>Well No.</u>	<u>Radium (pCi/l)</u>	<u>Gross Alpha (pCi/l)</u>	<u>Gross Beta (pCi/l)</u>	<u>Coliform (MPN/100 ml)</u>
RL-1: August	2	<2	20	26*
December	<1	<2	24	<1
RL-2: August	1	3	15	<1
December	<1	<2	<3	<1
RL-3: August	<1	<2	15	1
December	<1	<2	<3	<1
RL-4: August	34*	79*	415*	120*
December	16*	278*	286*	9.1*
RL-5: August	37*	60*	22	480*
December	30*	131*	75*	<1
RL-6: August	<1	9	22	120*
December	<1	<2	<3	<1
RL-7: August	<1	10	11	<1
December	4	37*	38	<1
RL-8: August	2	9	12	<1
December	9*	26*	<3	<1
RL-9: August	<1	**	**	<1
December	16*	26*	<3	<1
RL-10: August	<1	12	31	27*
December	22*	42*	27	39*
Drinking Water Standard	5	15	50	1.0

No pesticides or herbicides were found to be greater than the following drinking water standards. The concentrations listed also represent the detection limits.

Endrin	0.0002 mg/l
Lindane	0.004 mg/l
Methoxychlor	0.1 mg/l
Toxaphene	0.005 mg/l
2,4-D	0.1 mg/l
2,4,5-TP Silvex	0.01 mg/l

* = Exceeds Primary Drinking Water Standard

** = Insufficient sample quantity

TABLE IV
1984 GROUNDWATER MONITORING WELL ELEVATIONS
(Feet Above Mean Sea Level)

<u>Well No.</u>	<u>August</u>	<u>December</u>
RL-1 (Upgradient)	399.18	401.28
RL-2 (Upgradient)	401.40	403.74
RL-3 (Downgradient)	399.10	400.76
RL-4 (Downgradient)	390.79**	402.46**
RL-5 (Downgradient)	397.53	400.99
RL-6 (Downgradient)	398.69	400.38
RL-7 (Downgradient)	398.43	400.11
RL-8 (Downgradient)	398.58	399.36
RL-9 (Downgradient)	399.49	400.76
RL-10 (Downgradient)	400.64	402.09

** Levels distorted due to hydrocarbon layer.

The surface elevation in each of the wells was measured and recorded at each sampling. In August, the level in well RL-1 was depressed due to pumping from a deep production well. This pumping curtailed in late October. As it continues to rebound, it is expected to be hydraulically upgradient of RL-3 through RL-10 as designated. RL-2 is definitely upgradient of the site and the other wells.